

SyncWare News

The journal for technical
applications of T/S
computers

Volume 3 Number 5 May - Jun. '86

Sinclair-Amstrad Deal

In an effort to stave off creditors, Sinclair Research has sold the rights of the Spectrum computers to their biggest competitor, Amstrad. Amstrad has plans for marketing the Spectrum and Spectrum 128, but they will be targeting the Christmas season and concentrating on selling their line of computers during the rest of the year. They have turned down the QL option. This option, at this writing, has been bid on or contemplated by at least four companies; Psion and Tony Tebby, CST, A Plus Computer Response and Timex. The outcome of the sale is not yet known, but rest assured that QL support will not die. The QL is a very under-rated computer.

SyncWare Grows!

After just short of two years at the helm of SWN, and the advent of the QL magazine, I will no longer be managing editor of SWN. We would like to welcome Jeff Moore, who will become the new editor of SWN. I will be editing the Quantum Levels publication, which will be in print shortly. Jeff and I will be working very close together along with Fred and Tom Woods on future issues of SWN. Submissions to SWN may be made directly to Jeff, as he will be overseeing this end of the group. You can contact him at (216) 875-1257, or write to him at 602 S. Mill St., Louisville OH 44641 (pronounced Looissvil). Please feel free to address questions or submissions to any one of us, at any time.

Journal Goes!

The SyncWare JOURNAL is also in construction right now. We have noticed that Fred has had time to write some very fancy and technically significant software, not to mention some very large articles for SWN. In order to slow down Fred's prolific pace, he will manage the construction of the Journal. In fact, we have received so many articles that have not made it into print that we must publish a book to reduce the backlog of articles. The journal will contain many of the larger applications and tutorials that can't fit into the pages of SWN. It will be a few months before it is ready, but rest assured that it will be jam-packed with a significant quantity of "beef" for all the machines. We expect it to run about 100 pages (as Vol. 1 did). Many of the previous contest entries will be printed in the Journal. We will keep you informed of its progress.

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FOR YOUR SUPPORT

This column announces any software, hardware and related modifications that are new or otherwise untested by us. If you have something of interest, we will announce it here. Send us a description of your product (keep it short). We advise readers to send a self addressed and stamped envelope, as a courtesy, to the individuals or companies for information.

G. Russell Electronics, RD1 Box 539, Centre Hall, PA 16828, (814) 364-1325, has the Delta disk interface (with parallel printer port) for the QL for \$179.00 and 512K RAM plug in for \$219.00.

Byte-Back Inc., RT4 Box 54, Leesville, SC 29070, (803) 532-5812, has a real time clock for the ZX81 and 2068. It is battery backed and contains an output latch for external interfacing purposes. It comes with software for the computer you specify. Write for their new catalog for prices.

Variety Sales, 325 W Jersey St. #20, Elizabeth, NJ 07027, (201) 289-5699, has Tech Draw Junior (joystick version) available for \$18.99+\$3.00p&h for the 2068. Write for their new catalog.

Chia-Chi Chao, 73 Sullivan Dr., Moraga CA 94556 has a Disk File Manager for the Aerco FD-68 disk system. It will copy and verify files even on a single drive system and gives detailed information on the directory and tracks of the disk. It is available for \$16.00 on 5 1/4" disk or on tape.

G. Russell Electronics, RD1 Box 539, Centre Hall, PA 16828, has new TS2068 Computers with the Romswitch installed for \$159.00 ppd.

FORUM

Although it was not out intention to cause either mass hysteria or high anxiety, last issue's front page seemed to cause both. I never got so much mail in my life!! Would you believe 18 inches deep? If I haven't responded quickly to your letters recently, please understand why.

It seems that there is considerable interest in the possibility that a new Timex computer might appear on the market sometime soon. We can understand everyone's enthusiastic interest, but (I guess there really is no easy way to say it) don't look for it too soon. Don't bother those poor deluged Timex executives either. They don't know about it either. We tried to time that issue so that it would come out on April 1st (get it yet), but we were a day or two late. Pardon our pun, for you see, I have long been guilty of having a dry sense of humor. I sat down (quite some time ago) and dreamed up what I thought would be a great computer (by the way, all of those attributes exist, but not all on one computer). Add a few compatibility modes, and voila!

I was equally surprised to receive absolutely no comments at all about the Sinclair Aircraft. Being a commercial pilot, I frankly thought that that spoof was better.

However, having used an Atari 520ST for a short time and a QL for a longer time, I still feel that dollar for dollar the QL is a better buy. There is still

Larken Electronics, RR 2, Navan, Ontario, Canada, K4B 1H9, has a disk system for the 2068/Spectrum. It supports ss/dd drives; contains a relocatable operating system; 7 Basic commands and supports Basic, Machine code and Dim array saves & loads. It is available for \$95.00(US) + \$6.00 p&h.

Howard Sams & Co., 4300 W. 62nd. St., Indianapolis, IN 46268, (317) 298-5400, has a Computerfact package for the ZX81 (packs for other computers and peripherals too), which contains technical information designed for servicing these computers. The pack contains an original schematic, timing guidelines, oscilloscope outputs from various pins and more. It is available for \$19.95. Call 1-800-428-SAMS.

Fred Nachbaur, Mtn. Stn. Group Box C-12, Nelson, BC V1L 5P1, Canada, (604) 354-3858, has finished the JO Basic, which gives the Video Upgrade (SWN2/1, 2/2) Hi-Res and Sprite control over the TMS9918 co processor. This extended Basic includes much more and is available for \$29.95.

Lemke Software Development, 2144 White Oak, Wichita, KS 67207, has Pixel Sketch & Graphics Editor 2.0 available for the 2068. It has 64 column mode and screen dump to a large printer capability. The cost is \$19.95, but if you have version 1, then the upgrade is \$10.95.

E. Arthur Brown, 3404 Pawnee Dr., Alexandria, MN 56308, has Hacker's Handbook for those interested in communications for \$16.95. The 32K Non-Volatile Ram is available for \$109.95. Halon fire extinguishers (won't destroy your computer equipment if sprayed) are also available and come in 2 sizes. 1 lb. for \$14.95 and 2 lb. for \$29.95.

much more QL software than ST software. The full QL bus is available for any type of expansion that you might have in mind. Memory on the QL can easily be expanded to 640K (and make full use of it). Superbasic is superior for programming, since it is intertwined with Qdos. The Atari does have its advantages though. Since it has been designed as a closed system (like the Mac), you need only worry about Atari add-ons. There aren't many third party vendors (part of the reason for slow software development). It has excellent resolution is monochrome and is heavily dependent on the mouse (which can be a novel attribute). Don't expect the ST to do much until you get some software though. It doesn't come with any.

For those of you who scoff and are holding out for an Amiga, think \$2500 for a usable system (don't forget software).

I haven't really gotten carried away with these other computers (just responding to a number of inquiries about them), the 2068, 1500 and 1000 are great computers too. There are new products for these machines coming out all the time. They are easily expandable, simple to modify, cheap to upgrade and no slouch on graphics either. I very much enjoy all of my computers.

I do want to make a point. Continued support depends on you. If you keep your distributors in business, they will always be around to serve you. Just tell them what you want. Think about it.

Q & A

Dear Editor, By now I suppose you have heard from people who have tried the Byte-Back UM-64 mod (SWN 2/5). I now have Fred's Memotext running beautifully in ram, but I had some problems with the connections in the article.

Instruction 6 pg. 12 says, "Install a jumper from pin 5 of U10 to 'C'." This connects pin 5 to pin 6. Pin 5 of U10 should be jumpered to "D" after the trace cut instruction (1). "D" is hooked to U9 pin 5 on the UM 64, "C" isn't.

The drawing on page 11 shows "C" connected to pin 5 U10 by a UM 64 trace when it is actually connected to pin 6. The jumper should be shown from pin 5, U10 to "D" as mentioned above and not as it is shown.

These changes feed pure A15 to U9 and not the Gated A15 (GA15) and allows for an easy pick off point for the A15 input to the buffer.

James Holder, Huntsville, AL

I have pondered your questions for some time (as you know) and finally figured out what is wrong. The problem is on page 11. The "Backside of UM-64," should be "Backside of M-64." Jeff Moore did the UM 64 mod and Mark Fisher (CATS) and I did the M-64 mod and the subsequent drawing. However, there are several different boards out for the UM-64 and the new ones have this mod already done for you.

Dear Fred, Thanks for your continued work in supporting our computers. Keep up on those "One Chip Mods." I have played around with the Cassette Connection Mods and offer some comments.

1. Removing the Cap on the Mic circuit really squares up the Save square wave.
2. The suggested 1800 ohm resistor for R12 on the Load side is rather touchy. 3400 Ohms gives better volume control range. The piggy-backing resistor does not seem to give as good a result as the single value (I'm not sure why).
3. Bumping the 6 Volts on the recorder to 7.5 Volts improves the recorder output more reliably than changing the value of the last resistor in the output line (change of waveform).
4. The 7.5 V. and 3400 Ohm resistor usage make the load conditioners less helpful, perhaps less needed. Uploading from the 1000 with these changes is better accomplished by setting the volume at the lowest possible loading value.

Marinus Heusveldt, Lantana, FL

Dear Basil, I saw your "Delete" machine code routine and I would like to include it as a subroutine in the 8 to 16K area and activate it by RAND USR 8462. I don't understand the spaces around the LPRINT in the 1 REM (SWN 2/4).

Dan Sullivan, Seattle, WA

Dear Dan, First, the spaces around the LPRINT token are actually part of the ONE byte key word. Each keyword also includes spaces front and back, which makes for easy reading. They only appear in the display file and not in the memory location the

holds the LPRINT token. Remember, this is one of Sinclair's great memory saving tricks. Don't be fooled by it.

The listing (Fig. 4.3 pg 16 SWN 2/4) can be used by changing the three JP NZ instructions to relative jumps (JR NZ). This makes the routine 3 bytes shorter, but adds a few microseconds to the execution time. A modified listing follows:

```

16514 221 <> LD IX,
16515 33 5 16509
16516 125 7
16517 64 AND
16518 62 Y LD A,
16519 117 ? 117
16520 50 U INC A
16521 221 <> INC IX
16522 35 7
16523 221 <> CP (IX+0)
16524 190 4
16525 0
16526 32 4 JR NZ,
16527 249 RAND -7
16528 221 <> CP (IX+1)
16529 190 4
16530 1
16531 200 COS RET Z
16532 62 Y LD A,
16533 234 REM 234
16534 221 <> CP (IX+5)
16535 190 4
16536 0
16537 32 4 JR NZ,
16538 235 FOR -21
16539 62 Y LD A,
16540 13 7 18
16541 221 <> CP (IX+6)
16542 190 4
16543 0
16544 32 4 JR NZ,
16545 3 3 3
16546 221 <> PUSH IX
16547 200 FAST
16548 193 AT POP BC
16549 60 U INC A
16550 221 <> CP (IX+6)
16551 190 4
16552 0
16553 32 4 JR NZ,
16554 219 <= -37
16555 221 <> PUSHIX
16556 200 FAST
16557 200 LPRINT POP HL
16558 237 COSUB SBC HL,BC
16559 60 PI
16560 35 7 INC HL
16561 35 7 INC HL
16562 35 7 INC HL
16563 197 VAL PUSH BC
16564 221 <> POP IX
16565 200 LPRINT
16566 221 <> LD (IX+4),H
16567 116 ?
16568 4
16569 221 <> LD (IX+3),L
16570 117 ?
16571 3
16572 201 TAN RET

```

Revision of Figure 4-3 of Basil's COMPENDIUM
(SyncWare News, Vol. 2 Number 4)

Watch Out For RFI

Last issue, I discussed the problem of power surges and lightning. Now I would like to say a few words about other types of electrical noise.

Many of our subscribers are moving up to disk interfaces or high speed tape and having trouble saving and loading, getting their modems to work, having intermittent crashes that just can't be pinned down, etc., etc. Does any of this sound familiar?

As it turns out, we have a lot of hidden enemies just waiting to cause us grief. The number one enemy is your TV (or monitor) and the cable and output from the computer.

If you have intermittent crashes, put your arm near the TV. Do you feel static? Get some Static Guard (check the laundry room first) from the food store and spray the TV. Spray the floor, the table, the walls, your pants and the computer. Take your shoes off when you use your computer.

A nearby fluorescent light can be a real nuisance. Make sure that any lights of this type are quiet. If they emit any noise at all, then move them away from your cables, recorders any drives. In fact, just go incandescent.

Don't clutter your cables together behind the computer and in front of the TV. Separate your power cables from your interface cables and don't let them cross. Take your modem off of the disk drives, especially if it doesn't have a case. If your disk drive cable must pass right next to the TV output, then consider taping across the opening with some copper tape to reduce the RF noise and this goes for cassette cables too. When you access your peripherals, you can often see a pattern on the screen. Imagine what the monitor output is doing to your peripheral cable too!

All of your peripherals should have 3 prong plugs. If they don't, then beware that you may have a floating ground. For example, a light bulb socket that seems to burn out light bulbs more frequently than you feel they should last, might have the switch wired on the ground side. Turning the plug over in the wall will cure this problem. Similarly, a monitor or other device may not be grounded properly if it has a generic two prong plug. You might be surprised to know that your computer will function quite well while it rides a 100 Volt AC carrier; until you touch it and ground it. If you touch your monitor or other device (your arm is quite sensitive to this) and feel a slight sting, then you probably have this problem somewhere. This bad ground problem will prevent peripherals from functioning properly (and may blow your system).

Fred's Soapbox

All too often I hear comments like, "Since I got my TS2068, the TS1000's have been sitting on the shelf, awaiting a trip down memory lane." Another variant is, "As far as I'm concerned, the ZX81 is dead and gone" (the next time I hear that one, I think I'll scream.) Recently, the favoured comment of this genre has been, "Just got a new QL; I now have no more use for the 2068."

The attitude that underlies such comments is quite understandable. Our culture is deeply steeped in a philosophy of disposable technology. Planned obsolescence has become as much a fact of life as taxes and phone bills. When your vacuum cleaner breaks, you get a new one. When a new "food processor" hits the market, the old blender, which made perfect banana smoothies all these years, gets the boot. Most automobiles are purchased, not because of a real need, but because we simply got tired of the old one. Another factor, of course, is that mechanical things wear out; they reach a point where the repair of a machine costs more than a new one.

Enter the computer. IC's and related components do not wear out. Other components (such as electrolytic capacitors) actually last longer under constant use than if left inactive. If something goes wrong with a computer, the cause is almost always something minor (and mechanical) such as connectors and switches. In a very real sense, a computer gets

better with age; any manufacturing bugs have long since been taken care of, and components have been "burned in" for stable operation.

I'm not about to argue that the ZX81 is "just as good" as the 2068, though I've been known to do so. Nor do I contest that the QL is truly a quantum leap over the 2068 (and even most of its expensive contemporaries). The advance of computer technology over the last few years has been truly remarkable, to say the least. If you're fascinated by a new machine, by all means buy it! If you find yourself limited by your present system, by all means upgrade it!

What I AM saying is that any computer, by definition, is a MULTI-FUNCTION machine; just because you found a better machine for managing your files or for playing Scrabble doesn't mean that your older "inferior" machine isn't still capable of other tasks. People who blithely call ANY computer "obsolete" are missing this point completely. The situation is completely unlike a Compact Disc player (for example), which makes it painful to go back to those old scratchy records and hissy tapes.

Find something new for your old computer to do! Hardware hackers know about "dedicated" machines for controlling outside devices like houses and telescopes, or watching for rainfall and burglars. The idea of dedicated computers extends to software as well. The "Mandel-Plot" program that appears in this issue is an example of a program that can take days or weeks to run; do you really want to tie up your new machine with such a task? Your old TS1000, however, will be perfectly content to spend its time crunching away for days on end; when its done, it will spit out something that just might amaze and delight you. Very possibly, it will even get you

LARKEN DISK DRIVE ZX-81 Controller Boards for 2068

Features Common to Both:

- LDOS on Eeprom supports Basic Programs, Code blocks and Arrays
- Commands are-DIRECTORY,LOAD,SAVE,FORMAT,DELETE and EXIT
- The Directory is maintained by the DOS, (no need for manual directory entries as with some other disk drives)
- Up to 52 files per disk - Efficient use of disk space (no "pages")
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ZX-81 TS1000 features:

- The most Powerful DOS for the ZX-81 : Very User Friendly
- Dos uses 12K - 16K area : 2k RAM on disk controller
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2068 Features :

- Spectrum Emulator Compatible
- Disk with utility programs included
- Additional commands on disk

Prices : \$95.00 (US) for single drive controller

\$99.00 for 1 or 2 drive controller

\$ 4.00 for drive cable (all other cables included)

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started on a new hobby within the framework of your computer interest.

Finally, you are already familiar with your old system to a greater or lesser degree. Does it make sense to throw away all the expertise that you so arduously gained, just because someone turns up his nose and says, "You're still using THAT thing?" He's only demonstrating his own narrow-mindedness, so don't even bother arguing. Just be secure in your own knowledge.

A & J Notes

When using the A&J Microdrive "ESOS" (Exatron Stringy Operating System), there are times when you don't want it to change your RAMTOP. RAND USR 13083 instead of USR 12345 to initialize the system and take you to the "directory mode" menu without affecting current RAMTOP setting.

When using "Economy mode", only use the CERTIFY command (option 4) if you have nothing in the computer's program space (i.e. execute a NEW first). Otherwise you'll get clear-screen-itis.

With programs that allow you to RUN, you can save a little tape by entering CLEAR before you save it.

Pull out the wafer when done with it. Otherwise you'll get little bumps caused by constant capstan pressure. This usually doesn't cause problems until you try to re-initialize or certify the wafer. The reason is that the bumps will normally occur between files, but when you re-initialize you'll get parity errors when the bump is encountered.

If you have a Hunter board or other RAM in the 8-16K range, you might have conflicts with the A&J EPROM (especially if you can't selectively turn off the top 4K block). No problem, you can run the A&J operating system in RAM. POKE the EPROM contents (from 12288 to 16383) into RAM, (1 REM or string variable), and save to tape. Then simply remove the EPROM, and put it in a safe place. Actuate your 8-16K RAM and reload the tape. The code can then be POKEd (or block-transferred) back down, and will work fine. The other 4K (8192-12281) is yours to do with as you see fit. -fn

2068 LOAD Notes

Stan Nagrod reports that removing R11 from his computer cured his loading problems. I had tried this on mine, and found no discernable difference (from the computer's standpoint, it shouldn't have any effect). Presumably, this is a function of the recorder rather than the computer. (You can't hurt anything by trying it.)

On that subject, the LOAD AMP (SWN 2/5 pg. 8) cannot harm your SCLD. Its design limits the output swing to well within the limits specified by Timex. If anything, LOAD AMP will help protect against excessive input voltage. You could add a reverse diode to the clamp at the input of the SCLD, but then the maximum voltage swing at the SCLD input is only about 1.8 volts, and you'd be defeating the whole purpose of getting more signal to its input.

I heard from several users who, like me, have more trouble with loading after the machine warms up. LOAD AMP cured this in every case.

I'm not supplying LOAD AMPS anymore; instead, I encourage user groups to have a local hardware hacker build them up for anyone who needs one. If anyone out there wants to build them for general sale, go for it. Consider this a release to public domain.

Poor-Man's EPROM Eraser

Fred Nachbaur

(with thanks to Peter McMullin)

Sure, the "Atomic Fusion EPROM Eraser" works fine, on days when Old Sol is cooperative. Unfortunately, depending on geography and time of year, the reliability of this method can leave a lot to be desired.

There IS another easy alternative, which while not as cheap as a foam pad in the sun, is still a lot more economical than commercial erasers. Go down to an electrical supply house or appliance-repair shop and buy a "Ozone lamp" or "Germ lamp" of the type used in clothes dryers to help give that "sunshine freshness" to your tumble-dried blue-jeans. Also pick up a socket for it, a regular 100-watt incandescent light bulb, and a standard socket. The total cost of all this stuff came to about CD\$ 20, here in the backwoods of Canada.

The 100-watt bulb and socket will act as the ballast (and very big "pilot lamp") for your EPROM eraser. DO NOT try to run the ozone lamp directly from 120 volts, or you'll blow it for sure. Mount the two sockets on a board, with the "Ozone lamp" positioned such that you can slide an EPROM underneath it, almost touching the lamp. It's also a good idea to provide an shield for the ozone lamp; while the amount of UV it produces is unlikely to cause vision damage when looked at briefly from a reasonable distance, it CAN cause temporary "spots before your eyes."

2764's take about 20 minutes for full erasure with this set-up. Don't worry about heat damage, the ozone lamp doesn't get very hot. I suggest only erasing one at a time; remember that light intensity falls off as the inverse square of the distance from the source, so the further the EPROM is from the lamp, the longer it will take.

If you really want to get fancy, pick up a 20-minute timer from the same appliance shop and place it in series also. Other amenities: a pretty box to enclose the ozone lamp/EPROM, a power ON/OFF switch, and a fuse.

Don't just let your EPROMs cook while you go out for an extended time; in principle, they can be damaged by over-exposure. A final hint: for some reason, the first and last locations in an EPROM appear to be the last to erase. If you PEEK these locations and find them at 255, there's a very good chance that the EPROM has been fully erased.

Are We Not HACKERS?

Fred Nachbaur

There has been a lot of press over the last year about "hackers," referring to the dishonest minority of computer users who delight in crashing BBS's, breaking into data-bases, and generally wreaking havoc. A number of editorials have sought to plumb the psychology of these "hackers," with the general consensus being the obvious: These individuals are petty criminals, generically related to the punks who go about smashing windshields and putting sugar into gas tanks.

There's nothing "cool" about being a destructive force in an otherwise pacific community. Yet such individuals appear to take a perverse pride in themselves, going as far as to write "handbooks"

after they're busted so that other would-be thieves and saboteurs can pick up where they left off.

A problem for those of us who wish to see computers used for good, is one of semantics. The term "hacker" originally meant, "an amateur computerist who enjoys HACKING at his machine to make it do more than the manufacturer intended." Timex/Sinclair users, for the most part, are hackers in this original sense; the silly things won't even work right unless you hack away at circuit traces and microchips. Software nuts also applied the term "hacker" to themselves; perhaps the similarity with "hack writer" contributed to this humorous label.

The media has subsequently distorted the meaning of the term. Reporters and investigators who knew nothing about the amateur computer world automatically assumed that anyone who called himself a "hacker" was one of those petty crooks with puerile power hang-ups. The result here and now is that the term "hacker" has strong negative connotations. If you told your Aunt Bessie that you are a "computer hacker", you'd probably get a look of shock, disgust and pity.

So, a self-applied label has turned into a bit of an identity crisis. It is traditional for hobby groups to apply humorous, slightly self-deprecating labels to their practitioners. Amateur actors (and radio operators) are "hams," photographers are

"shutterbugs," astronomers are "stargazers," and geologists are "rockhounds." Such hobbyists wear their labels with pride, while not taking themselves too seriously.

We need a new name! "Hacker" has been corrupted by mass media, and must be replaced. "Computer Experimenter" and "Amateur Computerist" are accurate, but dry and long-winded. "Computer Nerd" is cute, but a little TOO self-deprecating. Rather than suggest any entries myself, I'll leave it up to you. What would YOU like to be called by the world?

Here's the deal. We'll run a "mini-competition" to get suggestions. The first stage is to send us your entry on a 3*5 postcard, addressed to:

FRED NACHBAUR
C-12 MTN. STN. GROUP BOX
NELSON BC V1L 5P1
CANADA.

ONE ENTRY PER POSTCARD, PLEASE. The second stage will be the voting; we'll publish the suggestions in SyncWare News, and ask our readership to NAME THAT COMPUTER BUFF. We'll tally the results, and publish the three most-liked entries. Those who suggested the winners will receive some trinket or bauble. The last stage is to promote our new name; we'll send letters of suggestion to the larger magazines, from where it just might make it to mass acceptance of our new identity. Too much to expect? Maybe. Still, it promises to be fun. PARTICIPATE!

32K BANKED MEMORY

Plugs into the TS2068 cartridge slot. This 32K ram is much more than just a memory. An on board battery keeps it alive even when you turn the computer off. Switch selectable for use in the DOCK or EXROM banks with NO mods to the computer. Write protect switch lets you use memory like an EPROM. Run your own plug-in BASIC programs! Extend capacity by 32K. Reduce or eliminate tape loading time. Detailed instructions include utilities for bank switching and data transfers. The perfect tool for extending your 2068's memory or for writing and debugging EPROM software. A beautiful board: solder masked, gold tipped, satellite grade anti-static coating. Very dependable and rugged. Battery included. Only \$109.95

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22 new commands for your TS1000! Advanced screen utilities make your ZX81 look more like a monochrome 2068. Includes READ, DATA, RESTORE, FILL MOVE, LEFT\$, MID\$, RIGHT\$, IN and OUT commands give you Basic control of I/O mapped peripherals which were previously accessed only in machine code. Extended Basic does not require the use of PEEK, POKE, or USR. Takes up just 3.5K of memory. 24 page manual, sample listings included. Unbelievable speed, excellent documentation. NO USR CALLS!! Only \$19.95

WATOR * ZX81!

Now the ZX81/TS1000/1500 has its very own (and very excellent) version of this popular ECOLOGY SIMULATION program; the idea of which first appeared in Oct. '84 Scientific American. WATOR recreates the ecology of 3 interdependent species. You can experiment by changing populations, feed cycles, reproduction, etc. Watch generations pass on the TV screen. Generate HI-RES population curves on the TS2040 printer. Very useful for studying predator/prey relationships. On cassette: Just \$16.95

UNIVERSAL I/O PORT

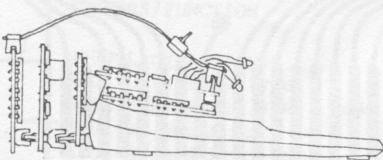
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BUILD A 2068 CARTRIDGE BOARD

John Oliger
11601 Whidbey Drive
Cumberland, IN 46229

In SWN 2/4 and 2/5, I discussed the construction of an eeprom programmer for the 2068 and 1000. Those of you with 2068's should find interest in a way to utilize programs that are burned onto those eeproms. The cartridge reader board will give you a way to run "Instant software."

If you are knowledgeable at making printed circuit boards, then you can use the artwork supplied here to make your own boards. You will have to install feedthroughs at each of the donut locations that don't have a resistor or socket passing through them. Alternately, I now supply a cartridge board with plated through holes for \$10.95, or \$15.95 with all of the necessary parts and requires no feed throughs to be soldered in.

ASSEMBLY INSTRUCTIONS for EPROMS

STEP 1: Solder the two 28-pin IC sockets onto the board, using extra care on the narrow pads surrounded by board traces. Solder resistors R1 and R2 onto the board where indicated, as etched onto the pc's component side of the board. Note that if you made your own board, you will have to solder these on BOTH sides of the board.

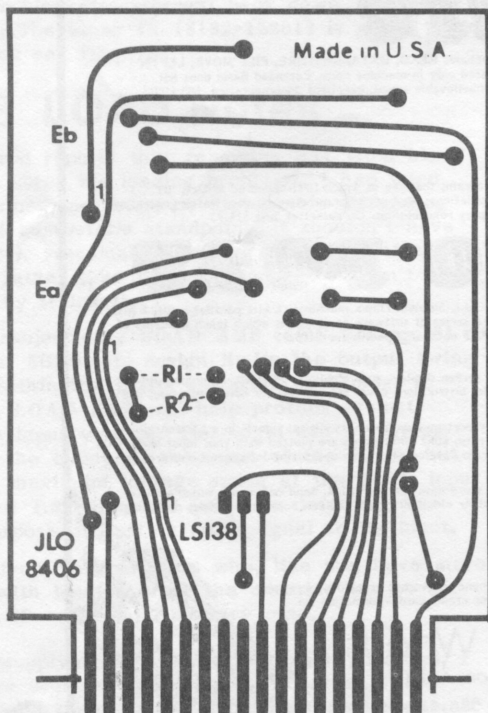
STEP 2: Carefully solder the LS/HC 138 IC in place on the board. DO NOT use an IC socket for this chip, or the board will not clear the TS2068's case upon insertion.

STEP 3: Use acetone and a soft cloth, or (preferably, for safety's sake) a commercial flux remover to clean all traces of flux from the board. CAREFULLY inspect all of your soldering, hunting for poorly soldered joints or shorts to nearby traces. Touch up anything looking even remotely suspicious.

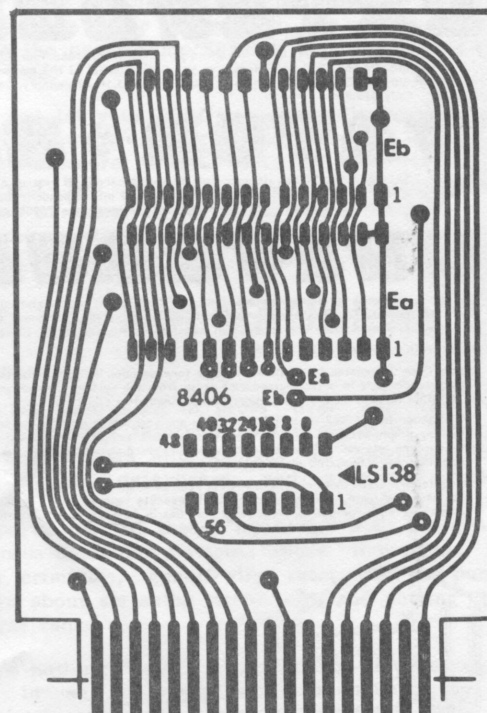
STEP 4: For 2764's, solder a wirewrap jumper from the 138's pins marked "32" and "40" to the donuts marked "Ea" and "Eb" respectively. For 27128's, solder diodes D1-D4 in place of the jumpers. Cathodes (banded ends) go to "32," "40," "48" and "56." The anodes of the two on "32" and "40" go to "Ea," and the anodes connected to "48" and "56" go to the "Eb" donut.

Your Cartridge Board is now complete and ready for EPROMs!

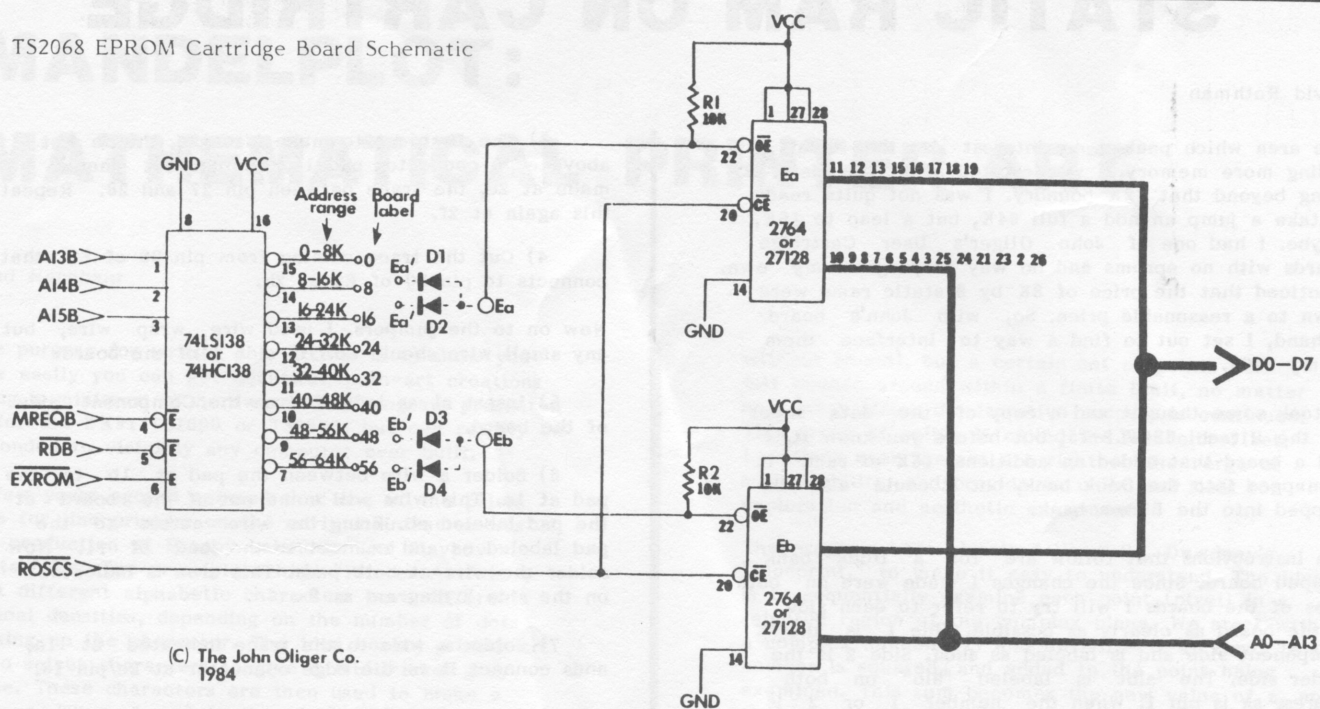
Component Side



Bottom Side



TS2068 EPROM Cartridge Board Schematic



PARTS LIST:

- 1pc....74LS138 or 74HC138 Decoder IC
- 2pcs....10K Ohm 1/4 Watt resistors
- 2pcs....28 pin low profile IC sockets
- 1pc....6" 30AWG solid wire for feedthroughs
- 4pcs....1N4148 or 1N914 Diode (D1-D4, used only w/27128 eprom)
- 2pcs....2764 or 27128 Eprom (Supplied by user)
- 1pc....3" 30AWG wire/wrap wire (Used only w/2764 eprom)

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Using Cartridges

On power up, the TS2068 looks at certain locations (hereafter called "AROS overhead bytes") in the ROS (ROM Oriented Software) bank of its memory space to see if a cartridge is installed in its cartridge port. If it finds the required data, it uses the information to set itself up for that particular cartridge. The data contained here, from 8000h to 8007h for AROS (Application ROM Oriented Software), tells the system the 8K memory "chunks" used by the cart within the ROS (cartridge) bank, the language the software is in (BASIC + MC or MC only), etc.

It should be noted here that the system also checks the bottom of the ROS bank for LROS (Language ROM Oriented Software) firmware (for example, an emulator board). We will be concerned only with AROS in our applications.

Because the AROS overhead bytes occupy 8000-8007h, the first byte available for our programs is 8008h.

To be efficient, we will start ALL of our BASIC programs at 8008h, and I recommend starting a MC-only program here also. In this article, however, I'll only cover BASIC language programs; The MC-only applications of this board are left to you.

Table 1 shows the AROS overhead bytes' locations, along with each location's function in the system and the recommended values for a typical BASIC program. These are the actual values we will be using for our purposes. MOST BASIC programs will run directly out of our cartridge as is, but a few may require slight modifications for functions not supported by the 2068 cartridge system. The only two functions I've found so far that are NOT supported on a cartridge that ARE supported in RAM-based programs are: 1) User defined functions (DF FN & FN), and 2) Non-executing FOR/NEXT loops such as FOR N=2 TO 0, which return with report "1" from AROS.

TABLE 1: AROS OVERHEAD BYTES

ADDRESS/FUNCTION	MEANING	OUR VALUE
8000=Language type	1=BASIC, 2=MC only	01h BASIC
8001=Cartridge type	1=LROS, 2=AROS	02h AROS
8002/8003=Prog. start add.	LSB/MSB of start address	0880h Prog. begins at 8008h
8004=8K chunk spec.	Bit 0-7=8K blks 0-7 used if 0	0Fh 8000-FFFFh in use
8005=Auto-start spec	1=autostart, 0=not auto	01h Autostart
8006-8007= RAM?	Bytes in RAM reserved	0000h All of RAM available

STATIC RAM ON CARTRIDGE

David Rothman

One area which peaked my interest is the idea of adding more memory. I was excited about the idea of going beyond that 72K boundry. I was not quite ready to take a jump and add a full 64K, but a leap to 16K, maybe. I had one of John Oliger's User Cartridge Boards with no eeproms and no way to program my own. I noticed that the price of 8K by 8 static rams were down to a reasonable price. So, with John's board in hand, I set out to find a way to interface them to my 2068.

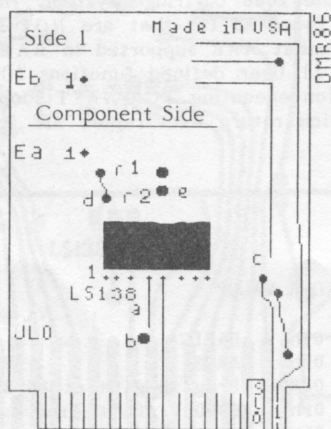
It took some thought and a copy of the data sheet for the Hitachi 6264LP-15, but before you know it, I had a board that added an additional 16K of ram. It is mapped into the Dock bank, but it could also be mapped into the Exrom bank.

The instructions that follow are for a Dock bank mapped board. Since the changes I made were on both sides of the boards I will try to refer to each side of the board as clearly as possible. Side 1 is the Component side and is labeled as such. Side 2 is the Solder side. The slot is labeled "slo" on both figures, as is pin 1. When the number 1 or 2 is followed by a lower case letter it refers to a position on the board as indicated on the diagram. Example: Locate the trace on pin 4 of the LS138 at 1a. It is located on side 1 of the board and is just to the right of the "8" in the LS138 label. This trace ends in a small donut.

The board does not use the WRite line in addressing the chip. Also the Read signal is used to select the chip, and is connected to the 74LS138. These two signals will need to be connected to the 6264's in order to read and write to them.

1) Find the trace on side 1 marked as 1a. The point 1b refers to the donut that is connected to the trace. With a sharp pointed knife cut through the trace just above the donut.

2) The next cut is made at 1c. This trace starts at the edge connector at pin 2. I made the cut as indicated at 1c after the donut. This is address line A13, it is also needed by the LS138 to decode the 6264's. The pad at 1c is a plated through hole. If you follow the trace on side 2 you will see it goes to pin 1 of the LS138. Now if you turn the board over to SIDE 2, the SOLDER Side, we will make a few more cuts.



3) The first cut to make is at 2c, this is just above edge connector pad 18. Another cut should be made at 2e, the trace between pin 27 and 28. Repeat this again at 2f.

4) Cut the trace coming from pin 20 of Eb that connects to pin 20 of Ea at 2h.

Now on to the jumpers. I used wire wrap wire, but any small wire should do. On side 1 of the board:

5) Insert r1 as indicated on the Component side of the board.

6) Solder a wire between the pad at 1b to the pad at 1e. This wire will come out of the board at the pad labeled eb. Bring the wire across to the pad labeled ea and connect to the lead of r1. Now solder the wire at both pads. This area is indicated on the side 2 diagram as 2a.

7) Solder a wire to the trace indicated at 1a, and connect it to the edge connector at 2c/pin 18.

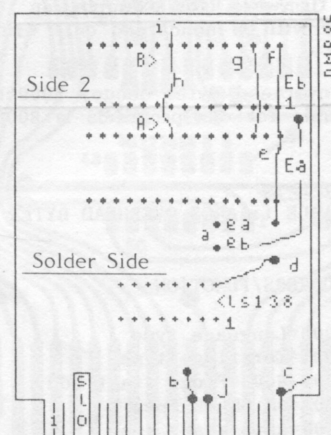
8) At pin 28 of Eb (2f) you need to connect a short jumper to pin 26(2g).

9) Solder one lead of resistor r2 to the pad at 2d. Now take a wire and attach it to the edge connector at 2c. Solder this wire to the other lead of r2. You now need to connect another wire to this lead of r2 and connect to pin 27 of Ea and Eb, at 2e and 2f. This completes the modification.

Pin 20 of Ea and Eb are the chip selects. They are connected to the appropriate chunk on the LS138 and are indicated by 2A & 2B.

What you are doing when you make the cut and jumper at 1a and 1b, is to connect ROSCS to the LS138 and move the RD signal to the Output Enable pin (22) of the 6264's. The WR signal is connected to the 6264's Write Enable pin(27) and is pulled high by resistor r2. The RD signal is pulled high by r1.

The drawings of the Cartridge Board that accompany this article were drawn with the help of TECHDRAW. This program is available from ZEBRA systems, Along with a Koala Pad and interface.



MANDELPLOT: MATHEMATICAL PRINTER ART

Fred Nachbaur

The purpose for writing this article is to show you how easily you can get beautiful math-art creations using a minimum of hardware. The program presented is for the ZX81/TS1000 or TS1500, but can readily be extended to virtually any computer ever built.

A few years ago, it seemed that one of the prime uses for line-printers on the early mainframes was the production of Snoopy calendars and Playboy centerfolds. The principle behind "Printer Art" is that different alphabetic characters have different optical densities, depending on the number of dots making up the character. The idea behind printer art is to select characters to give a multi-level grey scale. These characters are then used to make a picture. When viewed from a reasonable distance, the result is a very believable representation of the original picture.

As time went on, and printers became capable of dot-addressed graphics, this original form of printer art began to fall into obscurity. (The exception is the "computer portrait" outfits that frequent shopping malls, charging a couple bucks to dump your picture from a video camera to a dot-matrix printer.) The drawback to the dot-addressed approach is that it is very difficult to get more than a couple different degrees of shading.

Now, with the easy availability of high-quality reducing photocopiers, the original kind of printer art might once again become popular. The images depicted with this article should give you an idea of the potentials. The pictures here were made with a ZX81/TS1000 and 64K RAM, running the simple program shown. The first image was done with the TS2040. So if your 2040 is currently performing service as a book-end, dust it off and put it back onto the active duty roster.

The other picture was done with a Gemini 10 dot-matrix printer and Tasman interface, using the UPD utility published in an earlier issue (see SWN Vol. 2:6-ed.). The constraints of this medium required that the images be reduced considerably more than optimum; in somewhat larger sizes these are both very appealing, almost spectacular.

Mandelbrot Art

Both pictures here are of a mathematical object known as the Mandelbrot set, after Benoit B. Mandelbrot, the developer of the field of Fractal Geometry. I strongly suggest that you read the article on the Mandelbrot set by A. K. Dewdney in Scientific American, August 1985. In addition to an easily understood description of this fascinating mathematical construct, there are several beautiful colour plates of selected "places of interest" around the set.

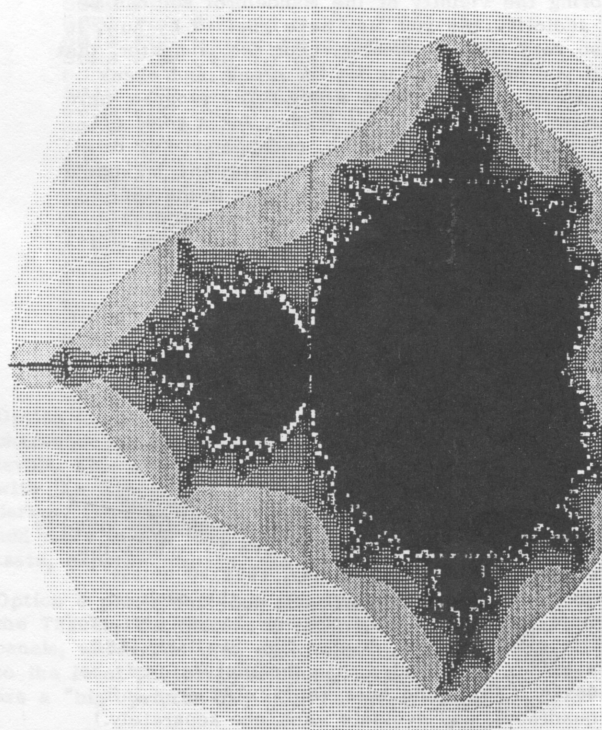
Mandelbrot art is based on a behavior of "complex numbers" when subjected to an iterative process. Most locations will eventually diverge (increase

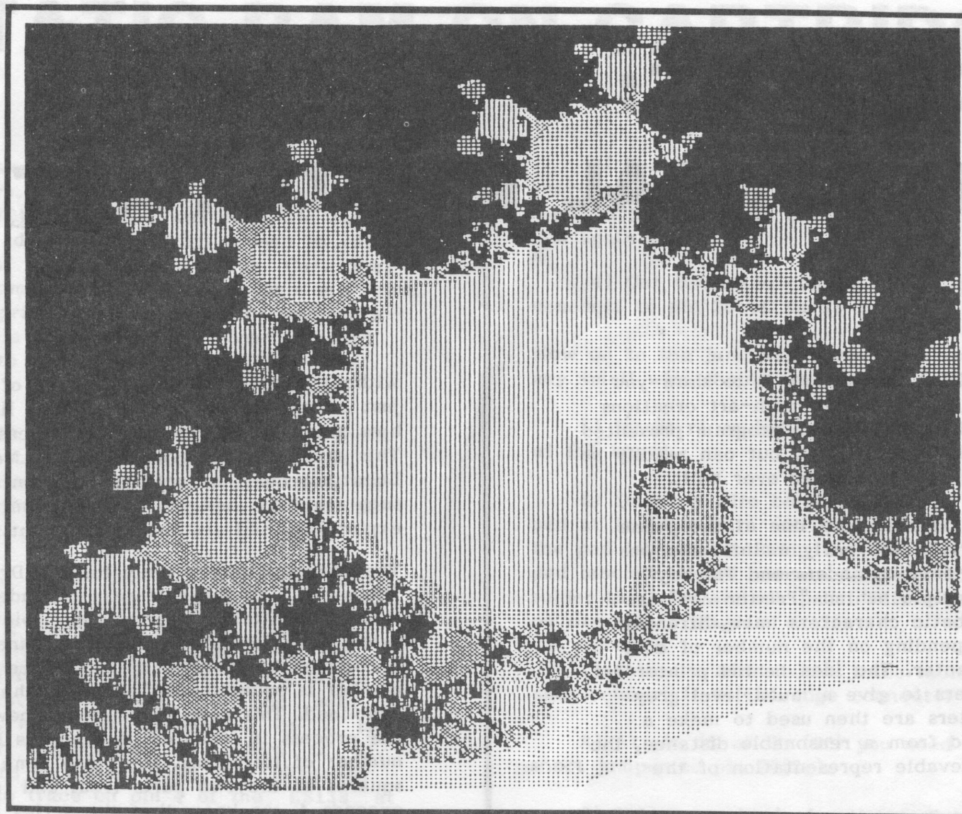
without bound), but a certain set of points will just bounce around within a finite limit, no matter how many times the iterative process is continued. This group of points is called the Mandelbrot set. Locations near the set are right on the verge of such stability, and provide an unlimited field for exploration and aesthetic enjoyment.

The program here closely follows Dr. Dewdney's "blueprint," to make it easy to understand. The idea is to sequentially examine each point (pixel) in a selected region of the complex plane. We start with a complex number (z) and initialize it at zero. This number is squared, and added to the point being examined. This sum becomes the new value of z , and the process is repeated. A count is kept of the number of iterations. If at any time the sum of the squares of the two parts (real and imaginary) of z exceeds 4, we know that the series is about to go screaming off into infinity.

The final value of the count variable then becomes the value assigned to that pixel in an integer array (string array on the ZX/TS machines). If the square of the size does not exceed 4 after a pre-determined large number of iterations, we assume that it lies inside the Mandelbrot set and will never diverge. After this has been repeated for every pixel in the plane, the final result can be plotted.

TS2040 Mandel-Plot





Centronics (Gemini) Mandel-Plot

Plotting is done by assigning a color or grey level to each range of numbers in the "picture" array. The picture therefore graphically represents the degree of stability of each point in the plane. Dark areas are close to stability, with black being the perfect stability of the Mandelbrot set. Lighter areas are increasing unstable, with the lightest shades representing points that "run away" almost immediately.

Exploring the vicinity of the Mandelbrot set can be very addictive. As you may have guessed by now, it is also very time-consuming. (For the computer, that is; all you have to do is let 'er crank, and check on progress once or twice a day.) The program here evaluates a 192x192 square region, for a total of 36864 (36K) points. As listed, each point may take up to about eight seconds to evaluate; the maximum running time (if the entire picture is inside the Mandelbrot set) is therefore on the order of 82 hours. Typically, pictures as those shown here will take about two days to "develop." If higher resolution is required, the time required to run will be even greater. To reproduce the resolution of the SciAm article, the run time could be up to 3 months (!) on the ZX81 or TS2068, or a couple weeks on the QL.

Entering the Program

The program listing is for the ZX81/TS1000 and 64K RAM. The 2068 doesn't quite have enough free memory to run the program as-is; you'll have to reduce the size of the picture array to, say, 160x160 unless you have additional RAM memory in the dock or elsewhere, or if you figure out how to put part of the data array into the display file. Similarly, 16K T/S machines will require that the picture array be, say, 96x96. (You could break a 192x192 area into four quadrants, and evaluate each one separately.)

```

1 REM MANDEL-PLOT FOR TS2040
  F.NACHBAUR MAR.86
10 LET MENU=1000
20 GOTO 500
100 FAST
102 IF M<192 AND N<192 THEN GOT
0 120
105 PRINT AT 10,0;"ALL DONE.",,
,
110 GOTO MENU+10
120 FOR M=M TO 191
130 FOR N=N TO 191
140 IF INKEY$=CHR$ 118 THEN GOT
0 400
150 LET CR=N*GAP+AC
160 LET CI=M*GAP+BC
170 LET ZR=0
180 LET ZI=0
190 LET C=0
200 LET R=ZR*ZR-ZI*ZI+CR
210 LET ZI=2*ZR*ZI+CI
220 LET ZR=R
230 LET SZ=ZR*ZR+ZI*ZI
240 IF SZ>4 THEN GOTO 270
250 LET C=C+1
260 IF C<128 THEN GOTO 200
270 LET P$(M+1,N+1)=CHR$ C
280 NEXT N
290 LET N=0
300 NEXT M
310 GOTO 100
400 CLS
410 PRINT "WORKING ON:","ROW "
,M,"COL ";N,"" "M" FOR MENU"
,,"ENTER" TO CONT "
420 PAUSE 4E4
430 IF INKEY$="M" THEN GOTO MEN
U
440 CLS
450 GOTO 150
500 CLS
510 SLOW
520 PRINT " INPUT CO-ORDS OF SW
CORNER OF PROPOSED MANDELROT
PLANE:","","A-CORNER (REAL PART)
="
530 INPUT AC
540 PRINT AC,"" "B-CORNER (IMAG
PART) ="
550 INPUT BC
560 PRINT BC,"" "LENGTH OF EACH
SIDE ="
570 INPUT S
580 PRINT S
590 PRINT "OK?"

```


When entering RUN, you are taken to the main menu. Press "1" to start out. Enter the co-ordinates of the "southwest" corner of the area to be examined, and the length of each side. After verifying your data, the program will start crunching away. To see how far along you are, hold the ENTER key; you'll get a report of the row and column currently being worked on. Press "M" to go to the menu, any other key to continue crunching.

You might want to return to the menu to SAVE what you have so far to tape using option 3. (This will be handy if you have only one machine, and use it to do Mandelbrot work while you sleep, work, eat, etc.) You can return to the project by pressing "2" from the menu.

Line 260 specifies the maximum number of iterations before the program "gives up" and assumes that the point is inside the Mandelbrot set. The number shown (128) is, by my experience, quite adequate for low to medium magnifications. For higher magnifications (length of side < .001 or so) you will have to increase this to avoid loss of detail. If you increase this beyond 255, you'll have to scale the result before placing it into the picture array; for example, if your maximum is 1000, you'll have to change line 270 to read LET P\$(M+1,N+1)=CHR\$(C/4)

Option 4 gives you a rough idea of how your picture turned out, and is helpful in determining the limits for your final plot. You are asked to enter the maximum number for "lit" pixels; any locations that took more iterations than this will be plotted black. This is sort of a "bare-bones" subroutine; you'll probably want to be able to specify a starting range as well to get a better idea of your ranges (hint: see line 6060). Better yet, write a frequency histogram routine that plots the relative frequency of occurrence of each number.

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```

600 INPUT Y$
610 IF Y$("<")="Y" THEN RUN
620 LET GAP=5/192
630 DIM P$(192,192)
640 LET M=0
650 LET N=0
660 GOSUB 100
1000 CLS
1010 SLOW
1020 PRINT AT 0,0;" WITH MENU"
",,,,"1: START A NEW RUN","2: S
AVE CURRENT PROGRAM STATE","3: R
ESUME CURRENT RUN","4: PREVIEW"
",,"5: SET LIMITS",,"6: FINAL HAR
D COPY"
1030 LET Z$=INKEY$
1040 IF Z$="" THEN GOTO 1030
1060 IF Z$="1" THEN RUN
1070 IF Z$="2" THEN SAVE "MANDEL
PLO"
1080 IF Z$("<3" OR Z$">6" THEN GO
TO MENU
1090 GOSUB MENU=VAL Z$
1100 GOTO MENU
3000 GOTO 100
4000 CLS
4010 PRINT " INPUT MAX. VALUE FO
R LIT PIXELS"
4020 INPUT MX
4030 LET M$=CHR$ MX
4040 FAST
4050 CLS
4060 FOR M=1 TO 188 STEP 4.4
4070 LET Y=M/4.4
4080 FOR N=1 TO 188 STEP 4
4090 IF P$(M,N)>M$ THEN PLOT N/4
Y
4100 NEXT N
4110 NEXT M
4120 PAUSE 4E4
4130 RETURN
5000 LET F$=" . * - _ "
5001 REM SPACE,PERIOD,ASTERISK,
GR.3, GR.T, GR.0, INV.SPACE
INV.ASTERISK, INV.SLASH,
GR.H, INV.SPACE
5010 DIM A(2,LEN F$)
5020 CLS
5030 PRINT " INPUT MIN/MAX FOR E
ACH CHAR:","","CHARACTER","MIN
MAX"
5040 FOR I=1 TO LEN F$
5050 PRINT F$(I);
5060 IF F$(I)="" THEN PRINT "(S
PACE)"
5070 INPUT A(1,I)
5080 PRINT A(1,I);TAB 22;
5090 INPUT A(2,I)
5100 PRINT A(2,I)
5110 NEXT I
5120 PRINT "OK?"
5130 INPUT Y$
5140 IF Y$="Y" THEN RETURN
5150 GOTO 5000
6000 FAST
6005 FOR I=0 TO 5
6010 FOR N=192 TO 1 STEP -1
6020 FOR J=0 TO 31
6030 LET K=32+I+J
6040 LET A=CODE P$(N,K+1)
6050 FOR L=1 TO LEN F$
6060 IF A>A(1,L) AND A<=A(2,L)
THEN GOTO 6100
6070 NEXT L
6075 SLOW
6080 PRINT "RANGING ERROR"
6090 GOTO 5130
6100 LPRINT F$(L);
6110 NEXT J
6120 NEXT N
6130 LPRINT
6140 LPRINT "-----"
6150 LPRINT
6160 NEXT I
6170 RETURN

```

Option 5 sets the range of numbers assigned to each character representing the various grey scale levels. Line 5000 defines the characters, starting with the lightest (space) and ending with the darkest (inverse space). Feel free to change them, add more levels, etc. Choosing ranges is a matter of taste, experimentation, and experience.

Option 6 prints out your final result. As shown for the TS2040, the picture is printed in six vertical panels, which you then paste side-by-side and take to the local photocopy shop for reduction. If you use a "big" printer and UPD (or other driver), the

alternate listing might help. In this case, since 64 columns are possible, the job can be done in three panels.

Should you wish to duplicate the pictures shown, here are the parameters I used to create them:

1: TS2040 PICTURE

A-Corner = -2
B-Corner = -1.25
Side = 2.5

RANGES: (10 levels):

0-0 : 1-1 : 2-2 : 3-3 : 4-4 :

5-5 : 6-14 : 15-29 : 30-127 : 128-128

2: GEMINI-10 PICTURE

A-Corner = .268
B-Corner = .00375
Side = .00172

RANGES (12 levels):

0-23 : 24-25 : 26-42 : 43-47 : 48-57 : 58-68 :

69-81 : 82-92 : 93-104 : 105-114 : 115-127 : 128-128

Here are a couple other areas you might find interesting:

3: A-Corner = .26

B-Corner = -.0042708333

Side = .01

Suggested Ranges (12 levels):

19-20 : 21-21 : 22-22 : 23-23 : 24-24 : 25-25 :

26-28 : 29-35 : 36-50 : 51-75 : 76-127 : 128-128

4: A-Corner = -.0721875

B-Corner = .96354167

Side = 0.17

Suggested Ranges (12 levels):

3-4 : 5-5 : 6-6 : 7-7 : 8-8 : 9-10 :

11-13 : 14-16 : 17-25 : 26-50 : 51-127 : 128-128

Mandel-Plot Modified Listing for
Gemini & Universal Printer Driver

```
1 REM MANDEL-PLOT FOR U.P.D.
  F.NACHBAUR MAR.86
5 LET LPR1=(YOUR USR ADDRESS)
  6 LET LPR3=(YOUR USR ADDRESS)
5000 LET F$="  :X%.*##-2"
6000 FAST
6001 REM SET 1/12" SPACING. THEN
      ENHANCED + DOUBLESTRIKE
6002 LET A$= CHR$ 27+ CHR$ 51+ C
HR$ 12+ CHR$ 27+ CHR$ 69+ CHR$ 2
7+ CHR$ 71+ CHR$ 10+ CHR$ 13
6003 RAND CODE "A"
6004 IF USR LPR3 THEN
6005 FOR I=0 TO 2
6010 FOR N=192 TO 1 STEP -1
6015 LET A$=""
6020 FOR J=0 TO 63
6030 LET K=64*I+J
6040 LET A= CODE P$(N,K+1)
6050 FOR L=1 TO LEN F$
6060 IF A >= A(1,L) AND A <= A(2
,L) THEN GOTO 6100
6070 NEXT L
6075 SLOW
6080 PRINT ,,"RANGING ERROR"
6090 GOTO 5130
6100 LET A$=A$+F$(L)
6110 NEXT J
6111 REM FOR UPD V1.02 ADD 6112
6112 REM LET A$=A$+ CHR$ 118
6115 IF USR LPR1 THEN
6120 NEXT N
6125 PAUSE 4E4
6130 FOR N=1 TO 5
6140 IF USR LPR1 THEN
6150 NEXT N
6160 NEXT I
6170 RETURN
```

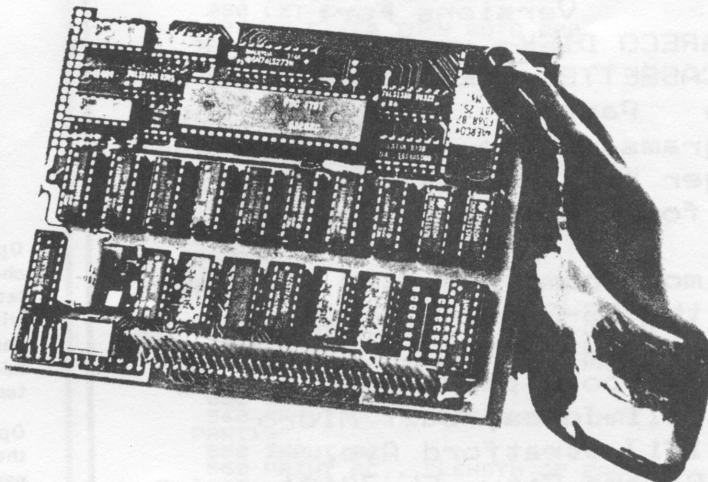
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VU-3D AND THE TASMAN I/F

David C. Ridge

With some simple modifications you can get full size printer copies from the popular TS2068 "VU-3D" program, using the TASMAN parallel printer interface.

- 1: Load VU-3D completely and break the program by going into a SAVE A DATA FILE command from the main menu, then press the BREAK and CAPS SHIFT keys during the SAVE.
- 2: Select INK 7, then LIST the BASIC program. Find the LOAD " " CODE: command in line 9 and put another one, exactly the same, right after it. Remove the LOAD SCREEN\$ command from line 9.

For example: LOAD "CODE: LOAD "CODE:

- 3: Now add the following lines. (Note: it is critical that you use the program line numbers exactly as shown!)

```
14 PRINT AT 0,0;" <<<type 32 spaces>>> " ; AT
1,0;" <<<type 32 spaces>>>"
15 PRINT INK 7;AT 0,0;"Large copy or small -
(L/S)?"
20 IF INKEY$="L" OR INKEY$="I" THEN GO TO 30
```

```
23 IF INKEY$="S" OR INKEY$="s" THEN GO TO 50
25 GO TO 20
30 PRINT AT 0,0;" <<<type 32 spaces>>> "
35 POKE 23548,0: RANDOMIZE USR 23296: CLS :
RETURN
50 PRINT AT 0,0;" <<<type 32 spaces>>> "
55 POKE 23548,1: RANDOMIZE USR 23296: CLS :
RETURN
```

```
9990 STOP
9991 SAVE "VU-3D" LINE 9
9992 SAVE "VU-3D" CODE 30720,34815
9993 SAVE "TAS-SHINWA" CODE 23296,255
```

- 4: Load the TAS-SHINWA graphics driver from the TASMAN interface software. (Note: TAS-SHINWA is for the SPIRIT 80 printer. Your printer may use a different graphics driver. In that case you would have to change the POKE and RANDOMIZE USR statements in the previous step to suit your particular software.)
- 5: Insert a blank tape into your recorder and save the whole thing by typing GO TO 9991. Be alert for screen prompts. When finished saving, this copy will be your final working version.

LOCATION FOR MACHINE CODE

Phil McConaghey
621 SW 72nd. Ave.
Pembroke Pines, FL 33023

When you turn on your TS2068 computer, POKE 23730,255 and ENTER. Then press NEW and ENTER. This will put RAMTOP at address 65535 which is as high as possible. Then input the following:

9999 PRINT FREE-276

When you GOTO 9999 the screen will display 38534, which is the number of bytes actually available in RAM for your program. This not only gives you another 168 bytes of RAM for BASIC programming, but also provides a protected area of 276 bytes between addresses 65260 and 65535 for machine-code. The computer will not overwrite that area because when the size of your program reaches 65259, the bottom of the screen shows "OUT OF MEMORY." You can place your machine code in this space and save to tape using the command

SAVE " " CODE 65260,276

This little trick should not be used if you intend to use the UDG (User Defined Graphics) mode.

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TS1000 VISIBLE SORT

Mark Fisher

This listing is a great way to get a handle on how sorting routines actually sort. Since the program has been designed to be friendly, it guarantees that the code is difficult to follow.

Lines 1 to 100 set up the arrays and provide instructions. Lines 101 to 196 plot the random points, both to the screen and to the position array. Line 210 puts the computer in slow mode after the screen is built. Insert 105 SLOW and then you can watch the screen being built. Lines 300 - 480 do the bubble sort and 500 - 770 do the shell sort. You can insert your own routine at line 900 if you so desire.

This listing can be converted for the 2068 by changing UNPLOTS to PLOT and using OVER 1 to over plot old locations on the screen and blank them out.

The program shows the shell sort to be much more efficient than the bubble sort. This is not always the case. If you are merging two files, in which the data are already close to their final position, the shell sort will scramble the data before putting them in their final order!

The Variables

S(39)	Holds the sample array
X	Utility counter
D	Carries random value to S(X)
MO	Move counter
Y	Utility counter for nested loops
Q\$	Query or tells if swap is made

Shell sort variables

M	Size of the swaps
X	Lower item to compare
Y	Upper item to compare
J	Inner loop counter

```

10 FAST
20 DIM S(39)
25 LET B$=""
30 PRINT "THIS PROGRAM PROVIDES A SLOW MOTION DISPLAY OF 2 COMMON SORT ALGORITHMS"
40 PRINT "PRESS A KEY TO CONTINUE"
50 PAUSE 4E4
60 CLS
70 PRINT "FIRST, POINTS WILL BE PLOTTED IN A RANDOM ORDER."
80 PRINT "THEY WILL THEN BE SORTED TO FORM A DIAGONAL LINE."
90 PRINT "PRESS A KEY TO CONTINUE"
100 PAUSE 4E4
110 CLS
120 LET Q$="010203040506070809101112131415161718192021222324252627282930313233343536373839"
130 FOR X=1 TO 39
140 LET D=INT(RND*LEN(Q$)/2)+1
150 LET S(X)=VAL(Q$(D TO D+1))
160 PRINT AT 20,0;B$
170 PRINT AT 20,0;"X AXIS = ";X
180 PLOT X,4+S(X)
190 NEXT X
200 PRINT AT 20,0;"CHOOSE SORT ROUTINE (B) BUBBLE(S) SHELL (Y) YOUR OWN"
210 SLOW

```

```

220 LET MO=0
230 LET Q$=INKEY$
240 IF Q$="B" THEN GOTO 300
250 IF Q$="S" THEN GOTO 500
260 IF Q$="Y" THEN GOTO 900
270 GOTO 230
300 PRINT AT 20,0;B$;B$
305 PRINT AT 20,0;"BUBBLE SORT"
310 "MOVE ="
310 FOR Y=39 TO 1 STEP -1
320 LET Q$=""
330 FOR X=1 TO Y-1
340 PLOT X,4
350 IF S(X)<S(X+1) THEN GOTO 44
360 LET Q$="Y"
370 LET MO=MO+1
375 PRINT AT 21,7;MO
380 UNPLOT X,4+S(X)
390 UNPLOT X+1,4+S(X+1)
400 LET T=S(X)
410 LET S(X)=S(X+1)
420 LET S(X+1)=T
430 PLOT X,4+S(X)
440 PLOT X+1,4+S(X+1)
450 UNPLOT X,4
460 NEXT X
470 IF Q$="Y" THEN NEXT Y
480 GOTO 780
500 PRINT AT 20,0;B$;B$;AT 20,0;"SHELL SORT"
510 "MOVE ="
510 LET M=39
520 LET M=INT(M/2)
530 IF M=0 THEN GOTO 780
540 LET J=1
550 LET X=J
560 LET Y=X+M
570 PLOT X,4
580 PLOT Y,4
590 IF S(X)<S(Y) THEN GOTO 730
600 LET MO=MO+1
610 PRINT AT 21,7;MO
620 UNPLOT X,4+S(X)
630 UNPLOT Y,4+S(Y)
640 LET T=S(X)
650 LET S(X)=S(Y)
660 LET S(Y)=T
670 PLOT X,4+S(X)
680 PLOT Y,4+S(Y)
690 UNPLOT X,4
695 UNPLOT Y,4
700 UNPLOT Y,4+S(Y)
710 LET X=X+M
720 IF X>=1 THEN GOTO 570
730 UNPLOT X,4
740 UNPLOT Y,4
750 LET J=J+1
760 IF J>39-M THEN GOTO 520
770 GOTO 560
780 PRINT AT 20,0;B$;B$
790 PRINT AT 20,0;"COMPLETE ";M
800 "MOVES REQUIRED"
810 PAUSE 4E4
820 FAST
830 CLS
840 RUN
900 PRINT AT 20,0;"NO ROUTINE YET"
910 PAUSE 150
920 GOTO 200
1000 SAVE "SORT"
1010 RUN

```



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SWN

SORTING THROUGH THE TS2068 SORTS

Robert Fischer

This article compares the sorting speed of three routines on randomized, inverted and ordered data. The listing uses REM statements so that you can tell where each of the sorting routines begins. During the testing, only one routine was programmed at a time so that routines near the end of the program would not be slowed by GO TO instructions stepping over unnecessary lines at the beginning (a Sinclair Basic quirk).

Quicksort #1 is from an article in Sync Magazine (March 84), and is included simply because it represents the only article I have seen on advanced sorting routines for the Timex. Its extensive memory requirements (413 bytes + 10 for each item to be sorted) makes it impractical for most uses. As seen on the chart, there are better solutions, so I didn't include this one in the program listing.

Quicksort #2 comes from an article in Creative Computing (May 83), which I have adjusted to work on the 2068. It is almost identical in speed to Quicksort #1, and although it requires 1084 bytes, it does not require more for each item to be sorted and will use less memory in most situations.

The Shell-Faulk routine is actually an improvement over the Shell-Metzner sort and is not only faster, but it also uses less memory (227 bytes). It is the one I use on my T/S Grader for the 2068 because of its overall versatility. Besides being easy on your computer's memory, it is the fastest at sorting random strings until you have 800 or more (even then the difference is small), and it will go through already sorted material or invert that material even faster.

Note on the chart how slow the Quicksorts are on anything besides random data! The Shell-Faulk is found twice in the listing, once using multi-statement lines and the other using single statement lines for the 1000.

Some categories on the chart have not been filled in because the trends became obvious, and I saw no reason to wait hours for the quicksorts to go through the data. Quicksort #1 uses too much memory to allow 3200 strings to be sorted.

The reason for sorting material that is already in order is two-fold. First, you may not remember if it was previously sorted and so sort again to be sure. Secondly, many routines slow down on "almost sorted" data, such as, when adding a file to a previously sorted list. Since there is no precise definition of "almost sorted," I just left the data ordered to be consistent.

Since the Table 1. results are somewhat misleading, I ran a special test with the Shell-Faulk and Quicksort #2 on an ordered list of 400 items. I changed the last item to be the first and timed how long it took each to reorder the data. The Shell Faulk took 82 seconds while the Quicksort took 1164 seconds. Although the gap narrowed considerably, the Shell-Faulk was still far superior.

```

1 REM X=NUMBER OF FILES
  L=LENGTH OF EACH FILE
  N$(X,L) HOLDS ALL FILES
100 REM = SET UP RANDOM FILES
110 LET X=100: LET L=10: DIM N$(X,L): FOR Z=1 TO X: FOR N=1 TO L: LET N$(Z,N)=CHR$(INT (65+RND*26)): NEXT N: NEXT Z: PRINT "READ Y": BEEP .5,40: PAUSE 0
1000 REM = SHELL-FAULK SORT FOR THE 2068
1050 LET M=X: LET S=M
1100 LET S=INT (S/2): IF S<1 THEN GO TO 9900
1115 IF S/2=INT (S/2) THEN LET S=S+1
1120 FOR N=1 TO M-S: LET J=N
1150 IF N$(J)>N$(J+S) THEN LET D=N$(J): LET N$(J)=N$(J+S): LET N$(J+S)=D: LET J=J-S: IF J>0 THEN GO TO 1150
1160 NEXT N: GO TO 1100
2000 REM = SHELL-FAULK SORT FOR THE 1000
2050 LET M=X
2055 LET S=M
2100 LET S=INT (S/2)
2105 IF S<1 THEN GO TO 9900
2115 IF S/2=INT (S/2) THEN LET S=S+1
2120 FOR N=1 TO M-S
2130 LET J=N
2140 IF N$(J)<N$(J+S) THEN GO TO 2160
2143 LET D=N$(J)
2145 LET N$(J)=N$(J+S)
2150 LET N$(J+S)=D
2155 LET J=J-S
2157 IF J>0 THEN GO TO 2140
2160 NEXT N
2165 GO TO 2100
4000 REM = QUICKSORT #2 FOR 2068
4100 DIM P(20): DIM U(20): LET N=0: LET C=0: LET K=1: LET P(K)=1: LET U(K)=X: LET L=1: LET R=X
4110 IF (R-L)<9 THEN GO TO 4240
4120 LET I=L: LET J=R
4130 LET C=C+1: IF N$(I)>N$(J) THEN GO TO 4180
4140 LET J=J-1: IF J>I THEN GO TO 4130
4150 LET J=J+1
4160 LET K=K+1: IF (I-L)<(R-J) THEN GO TO 4230
4170 LET P(K)=L: LET U(K)=I: LET L=J: GO TO 4110
4180 LET N=N+1: LET D=N$(J): LET N$(J)=N$(I): LET N$(I)=D: GO TO 4200
4190 LET C=C+1: IF N$(J)<N$(I) THEN GO TO 4220
4200 LET I=I+1: IF J>I THEN GO TO 4190
4210 LET J=J+1: GO TO 4160
4220 LET N=N+1: LET D=N$(J): LET N$(J)=N$(I): LET N$(I)=D: GO TO 4140
4230 LET P(K)=J: LET U(K)=R: LET R=I: GO TO 4110
4240 IF (R-L+1)=1 THEN GO TO 4280
4250 FOR I=(L+1) TO R: FOR J=L TO (I-1): LET Y=I-J+1: LET C=C+1: IF N$(Y)<N$(Y+1) THEN GO TO 4270
4260 LET N=N+1: LET D=N$(Y): LET N$(Y)=N$(Y+1): LET N$(Y+1)=D: NEXT J
4270 NEXT I
4280 LET L=P(K): LET R=U(K): LET K=K-1: IF K=0 THEN GO TO 9900
4290 GO TO 4110
9900 REM = PRINT ORDERED FILES
9910 BEEP .5,30: FOR N=1 TO X: PRINT N$(N): NEXT N

```


When you type in the listing, you should only enter the lines for the routine that you want since only the first listing will sort anyway.

The 1000 can only use one of the routines as written, but you will have to change the PAUSE 0 to PAUSE 4E4, and forget the BEEP statement.

When the program prints "READY," just press a key to start sorting.

There are two changes that you may wish to make in the listing. As shown, the routines only alphabetize strings, but you may want to invert the order or sort numbers instead.

To invert the order, make the following changes:

1. Line 1150 - change the > in the first statement to a <.

2. Line 2140 - change the <= to >=.

3. Line 4130 - change the < to >.

4. Line 4190 - change the < to >.

5. Line 4250 - change the <= to >=.

To sort numeric arrays change all references to N\$() to just N() and D\$ to just D. Also, when setting up the numeric array, it should have just one dimension instead of the two used for strings.

If you have a better routine or can improve on these, drop me a line and I'll do a follow up if necessary. I would also be interested in machine code sorting routines for string and numeric arrays.

Table 1.

Comparison of Sorting Times for three different sort routines

Key:

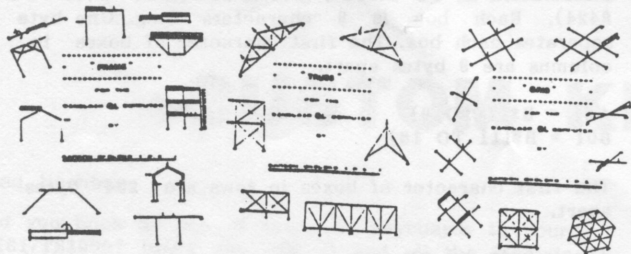
R-Random
I-Inverted
S-Sorted

Times in seconds on 2068
Averages of 8 test runs each
Files of 10 strings each

SORT
Routine Type

Number of strings to sort

	50	100	200	400	800	1600	3200
Quick Sort #1 R	14.4	34.1	80.2	177	421	887	Beyond Capacity
Quick Sort #1 I	42.5	168					
Quick Sort #1 S	43.2	169					
Quick Sort #2 R	14.3	33.8	77.6	184	403	884	1977
Quick Sort #2 I	41.4	152	564	2286			
Quick Sort #2 S	37.4	145	551	2190			
Shell Sort R	11.8	29.9	74.8	184	430	1049	2402
Fault Sort I	10.1	23.2	56.6	126	278	629	1427
Fault Sort S	4.7	11.2	26.4	61	131	293	685



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SWN 3:3 had a few greebles:

When printing "GET" (pg. 10-11), the hex disassembly was omitted for space considerations, but the text still refers to it. You'll have to use a decimal loader (see previous issues) to input the values from the decimal table, instead of using a hex loader.

"ONE-CHIP MODS," page 14, tells you to prepare the chip after doing the final wiring (say again?) The last two paragraphs in the left panel are in the wrong position; they should go before the paragraph on "final wiring."

DICE 1000 has a classic boo-boo; Version 2.0 documentation with a Version 2.1 program. Line 290 used to read, POKE 16573,INT(RND*6)+1. It is not needed because the author included this in the machine-code in the program as listed. The 5th entry in the offset table should therefore be deleted. The last entry in the offset table should be "Character printed - start +89" (not 90). Other clarifications: Line 270 sets how many times the dice will be rolled, and is currently set at 4 to 7 (not 3 to 5). The delay constant at 16561 may be a number from 0 to 10, inclusive. The decimal table and listings are correct as published.

UPGRADING VU-CALC 1000

Chuck Peterson

VU-CALC for the ZX81/TS1000-1500 is a good program, but it has some limitations. Among them:

- 1) Once you've started using the program, you can't add, delete or edit BASIC lines at will. If you do, the program crashes.
- 2) The only way to get a print-out is with the COPY command.
- 3) Keyboard entry is quite slow.

Fortunately, modifications can easily be made which overcome these three limitations. The first one re-initializes VU-CALC's machine code every time you re-enter the program through the "C" (CONTINUE) option. This allows you to add, delete and edit BASIC lines. The mod can be added to a copy of VU-CALC which has titles and formulas in it.

LOAD your copy of VU-CALC. If it has no titles or formulas in the grid, enter some. For example, enter titles into boxes A01 to A03 and C01 to C03. It will be useful later if you enter the title of the box itself: "A01" into box A01, etc. STOP the program, then enter a line to hold machine code and a loader for entering it:

```
14 REM 12345678901234567890123
45678901234
6000 DIM A$(4)
6010 FOR F=19656 TO 19689
6020 INPUT A$
6030 POKE F, VAL A$
6040 PRINT A$;
6050 NEXT F
6060 DIM A$(0)
```

Line 6060 is of special interest. It will clear the variable A\$ from memory. The program will then stop with report 3/6060. Any string variable (undimensioned or array) can be cleared in this manner. All other variables are left intact. Any dimensioned numeric variable (but not undimensioned variables) can also be cleared in this way.

Before loading the machine code, check to make sure the REM line is long enough. Enter PRINT PEEK 19653. If this prints 36 to the screen, you have enough space reserved. Start the loader using GOTO 6000, then enter the following numbers one at a time:

```
58 134 64 167 40 24 42 16
64 1 238 32 9 1 35 0
17 3 65 235 115 35 114 35
35 235 9 61 32 245 205 143
65 201
```

After the program stops, check the numbers on the screen against the listing, and re-do it if you find any errors. If all is well, edit line 2000 to read:

```
2000 LET Z=19656
```

SAVE the modified program "just in case". You can now restart VU-CALC using GOTO 110. DON'T USE RUN! Enter the "C" option to CONTINUE. If you've made a mistake, you'll get a messed up screen. Start over again after pulling the plug or resetting.

Here's a hex disassembly for those who use a hex loader:

4008 3A8640	LD A, (4086)
400B A7	AND A
400C 2818	JR Z, CALL
400E 2A1040	LD HL, (VAR5)
40D1 01EE20	LD BC, 20EE
40D4 09	ADD HL, BC
40D5 012300	LD BC, 0023
40D8 110341	LD DE, 4103
40DB EB	EX DE, HL
40DD 73	LD (HL), E
40DD 20	INC HL
40DE 70	LD (HL), D
40DF 20	INC HL
40E0 20	INC HL
40E1 20	EX DE, HL
40E2 09	ADD HL, BC
40E3 3D	DEC A
40E4 20F5	JR NZ, POKE
40E6 CD8F41	CALL 418F
40E9 C0	RET
40EA 00	NOP
40EB 00	NOP

Now that you can add and delete BASIC lines, it is possible to program custom print-outs. All the information in VU-CALC's grid is stored in B\$(2 TO 8424). Each box is 8 characters long. One byte separates each box. The first character of boxes in columns are 9 bytes apart.

```
A01 = B$(2 TO 9)
B01 = B$(11 TO 18)
```

The first character of boxes in rows are 234 bytes apart.

```
A01 = B$(2 TO 9)
A02 = B$(236 TO 243)
```

Using this information, it is possible to calculate the location of any box on the grid. Let's have the computer do it. Add the following short demo routine to VU-CALC. It locates, PRINTs, and LPRINTs information from the grid boxes.

```
6000 PRINT "ENTER ROW/COLUMN: E.G. "B03""
6010 INPUT A$
6020 LET Z=9*(CODE A$-28)+2
6030 LET Z=Z+234*(VAL A$(2 TO)-1)
6040 PRINT A$;TAB 5;"B$("Z;" TO "Z+7);";
6050 PRINT TAB 23;B$(Z TO Z+7)
6060 LPRINT B$(Z TO Z+7)
6070 GOTO 6010
```

Start the routine using GOTO 6000. When the cursor (in quotes) appears, enter the row and column number of a box containing information. Use the format: "D05", "R27", etc. The routine will print the location and contents of the box to the screen, and then LPRINT the contents. To stop this routine, press ENTER (only) when the cursor asks for input.

Finding and printing one box at a time isn't very useful. Let's assume that you want to print boxes A01 through A03 and C01 through C03. Calculate the beginning number of the first and third boxes in row A (which turn out to be 2 and 470). Calculate the beginning number of the first box in row C (which is 20). A short BASIC routine will print the information.

```
7000 FOR F=2 TO 20 STEP 18
7010 FOR G=F TO F+468 STEP 234
7020 PRINT B$(G TO G+7);" ";
7030 NEXT G
7040 PRINT
7050 NEXT F
7060 STOP
```

Line 7000 determines whether row A or C is printed. Line 7010 determines whether column 1, 2 or 3 is printed. It's a little tricky, but if you're confused then calculate by hand what the value of G will be for each pass through the loops. This will help you see what's going on. For hard copy, change the PRINT statements to LPRINT.

You now have the ability to modify the program, and can program your own custom print routines, making the program more useful. VU-CALC is nearly 16K long, which doesn't leave you much room beyond the short routines presented here. If you want to add more, you will need more than 16K. [See also SWN Vol. 1 "Byte-Pynchers" for info on condensing the existing BASIC to allow more room for changes -fn.]

The final change this time around involves speeding up the keyboard delays. This allows faster entry of data and formulas. There are two simple ways to speed up keyboard response.

- 1) Alter the value in the main timing loop.

CHANGE VALUE	DESCRIPTION	ORIGINAL VALUE
POKE 17459,100	Main timing loop	0
POKE 17592,25	Cursor delay	10
POKE 17600,25	Cursor delay	10

Advantage: Everything is speeded up.

Disadvantage: Program messages are only printed for a split second, with no simple way to keep them on the screen longer.

- 2) Alter only the values of the two keyboard delays:

CHANGE VALUE	DESCRIPTION	ORIGINAL VALUE
POKE 17783,16	LOAD DATA/TITLES	32
POKE 17981,16	ENTER FORMULA	32

Advantage: Keyboard response is faster for entering titles and formulas. Program messages are unaffected.

Disadvantage: The program takes its normal slow time in going from one option to the next.

It would be ideal to have fast response time and long delays for displaying messages. At present, the two are interactive. The authors of VU-CALC failed to include a subroutine to test if a key was still being pressed. Instead, they used delays to assure that a key has been released. Not only that, but in several cases they used the same delay to determine how long a message would be displayed. If I come up with ways of patching in other improvements, I'll let you know via this magazine. Meanwhile, you're encouraged to experiment with this and other options on your own.

CUSTOM KEYBOARD TIP

Fred Nachbaur

Did you hook up one of those TI keyboards to your ZX81/TS1000? Don't you wish it had all the Sinclair legends on the keys? Well, if you can find an old membrane keyboard (remember those?) you can cut it up and paste the legends onto the keys with silicone glue (RTV-Room temp. cure).

The membrane keyboards consist of three layers; the top layer, which has the legend artwork, a separator layer with holes and a bottom layer. Use an X-acto knife and start to separate the top layer, and peel it loose from the other layers with one quick motion to help prevent creases. Use a sharp pair of scissors to cut up the top layer into its individual "keys." You'll have to cut right along the top of the keywords, and along the bottom of the functions so that the "covers" don't lap over the edge of the keys. Similarly, cut right along the edge of the white portion on the left and right. The corners have to be clipped also, you might lose part of the first letter of the keywords but cutting it close will help prevent peeling later.

Clean the keytops with alcohol and q-tips to remove any oils that your fingers may have left on the keys. This will promote adhesion considerably.-ed.

Put a dab of clear silicone cement on each key, one at a time, and push the appropriate cover on with the eraser end of a pencil. The excess silicone will squish out, forming beads along the sides; leave these alone until after the silicone has dried, at which time they will be easy to remove. Even if the keytops are curved (as they are on the TI keyboard), the "vacuum" produced will keep the covers in place until the silicone dries if you used enough to assure a uniform layer. When dry, tap each key with the pencil end of a pencil; any that are loose will make a distinctively different sound. Re-do any that are suspect, or that have obviously lost the "curve."

You may also consider moving the keys around! This is required in order to have the keys make the most sense on the ZX81; for instance, the cursor keys on the TI are on D, S, X and E; move these to 5, 6, 7 and 8. Similarly, some of the other keys have other symbols on the front, which can go into whichever position makes the most sense on the Sinclair. Since you're covering the tops, it doesn't matter that they'll be in the "wrong" position.

1000 2K TEXT WRITER

Owen Christianson

This program was written on a 2K TS1000 and will handle a full screen of text. It gives you a full screen editor that will handle about 20 words per minute. You can print the screen to the printer by Lprinting, and Stop will bring you to a halt at line 410. Run to restart the program as the screen will be collapsed after any clearing of the screen.

[We experimented with this listing by compiling it on the Bob Berch compiler (available from G. Russell Electronics). It was necessary to change line 120 to: LET Z=CODE INKEY\$, change all P\$ references to Z and delete all of the CHR\$ tokens. What did we find?

First, the text writer would not handle less than about 80 words per minute, so it was necessary to add a loop in the input to slow it down. Even the uncompiled version (without string references) ran at about 35 words per minute. It would no longer fit in 2K. (It was 2200 bytes). This program was definitely fun to play around with. Being short, it was easy to follow through and see the necessary steps required to build a more sophisticated full screen word processor.-ed.]

```
10 REM TEXT WRITER
20 FOR I=1 TO 22
30 PRINT "
40 NEXT I
50 LET R=0
60 LET C=0
```

```
70 LET P=C+33*R
80 LET A=PEEK 16396+256*PEEK 1
6397+1
90 LET X=PEEK (A+P)
100 POKE (A+P),X+128
110 IF INKEY$="" THEN GOTO 110
120 LET P$=INKEY$
130 POKE (A+P),X
140 IF CODE P$>111 AND CODE P$<
116 THEN GOTO (P$=CHR$ 115)*200+
(P$=CHR$ 113)*250+(P$=CHR$ 114)*
280+(P$=CHR$ 112)*330
150 IF P$>CHR$ 115 THEN GOTO 29
0*(P$=CHR$ 121)+330*(P$=CHR$ 227
OR P$=CHR$ 225)+70+120*(P$=CHR$
118)
190 POKE (A+P),CODE P$*(P$<CHR$
118)
200 LET C=C+1
210 IF C>31 THEN LET R=R+1
220 IF C>31 THEN LET C=0
230 IF R>21 THEN LET R=0
240 GOTO 70
250 LET R=R+1
260 IF R>21 THEN LET R=0
270 GOTO 70
280 LET C=C-1
290 IF C<0 THEN LET R=R-1
300 IF C<0 THEN LET C=31
310 IF R<0 THEN LET R=21
320 GOTO 70
330 LET R=R-1
340 IF R<0 THEN LET R=21
350 GOTO 70
360 LET C=0
370 LET R=R+1
380 IF R>21 THEN LET R=0
390 GOTO 70
400 POKE (A+P),X
410 IF P$=CHR$ 227 THEN STOP
420 COPY
430 GOTO 70
```

TS1500 VIDEO TOPICS

F. Nachbaur

How would you like reverse video on your TV screen when using your TS1500? Not only is it possible, but it's also ridiculously simple. All it involves is installing an SPST switch, and soldering two wires.

Locating the switch is perhaps the hardest part of the mod, as there isn't too much spare space available. Probably the best place is right in the centre of the rear apron of the upper case half. Run two wires from the switch.

Locate resistors R20 and R30. These are between the ROM, SCLD and modulator case. Connect the left end of each of these resistors to your switch wires. Voila!

When the switch is closed, your TV picture will be reversed. The contrast is lower than optimum, but on most sets you can get a quite acceptable inverse video picture by turning the contrast up, and the brightness down. By the way, the left side of R20 is also a good place to pick up composite video for a monochrome monitor (high-impedance input preferred; if you have a lo-z 75 ohm monitor, use an emitter follower as described in SWN Vol. 1). Also, the video reverse switch will NOT reverse the signal to the monitor, only to the TV.

How does it work? Beats me, I just found out about it by accident. I can't even find R30 on the schematic! Needless to say, additional experimentation is encouraged, and additional discoveries are welcome.

TS1500 MEETS OLIGER VIDEO

Yes, you can use the TS1500 with John Oliger's TMS9918A video upgrade. The required modification to the computer's NMI line is MUCH easier than with either version of the ZX81/TS1000 board.

First, check that your machine has a 2200 ohm resistor (red-red-red), in parallel with a small capacitor, tacked on near the top end of the CPU. If so, you won't even have to add the 4.7K resistor. If not, run the 4.7K resistor between the donut pad going to edge trace 12A, and the top end of capacitor C17.

You only have to make one trace cut, and bridge it with the 1N914/1N4148 diode. This is the first trace below the CPU chip (pin 20-21 end) on the component side. Carefully scrape away the varnish on this trace with the tip of your Xacto knife, and cut the trace. Now bridge the cut with the diode, cathode (banded) end towards the left (away from the heat sink). This trace is very narrow, so be careful when soldering. If you use too much heat, the trace could lift off. Bend the diode leads at right angles to the body, then bend the ends (about the last 1/8") into an "L" shape so that a larger area is available for soldering. Carefully clean the flux from the area using methanol, to insure that you have a good solder joint and that you didn't accidentally solder to the adjacent trace.

2068 PC BOARD AID

John McMichael

This program is designed as an aid in laying out a PC board for the Sinclair computers. The 2040 listing will give the correct 0.1" spacing for the edge connector.

For best results, xerox the thermal paper, fold it in half and line up the top and bottom edges and you can then line up both sides of your PC board for a perfect match every time.

```

5 CLS : PLOT 40,20: DRAW 110,
0: DRAW 60,140: DRAW -110,0: DRAW
0 -60,-140: DRAW 0,-4: DRAW 110,
0: PLOT 150,20: DRAW 0,-4: DRAW
60,140: DRAW 0,-4: PLOT 65,20: D
RAW 3,10: DRAW 4,0: DRAW -3,-10:
PLOT 180,20: DRAW 60,140: PLOT
178,25: DRAW 2,-5: DRAW 5,2: PLO
T 235,168: DRAW 5,2: DRAW 2,-5
7 PRINT AT 7,14:"PRINTED":AT
9,13;"CIRCUIT":AT 11,12;"BOARD":
AT 17,7;"slot":AT 9,24: FLASH 1:
"LENGTH?": FLASH 0
10 LET x=144
20 FOR n=0 TO 7
30 READ r: IF r=256 THEN GO TO
140
40 POKE USR CHR$ x+n,r
50 NEXT n
60 LET x=x+1: GO TO 20
100 DATA 60,60,60,60,60,60,60,6
0
110 DATA 63,63,63,63,63,63,63,6
3
120 DATA 252,252,252,252,252,252,25
2,252,252
130 DATA 36,0,36,0,36,0,36,0
132 DATA 0,60,0,0,0,0,60,0
135 DATA 256
140 LET b$=""
150 LET b$=b$+CHR$(7)
160 LET b$=(7 TO 6)=""
165 LET e$=""
170 INPUT "LENGTH OF P.C. BOARD
IN INCHES?" L

```

```

175 CLS : PRINT AT 8,6;"TURN PR
INTER ON AND";AT 11,3;"PRESS ANY
KEY TO CONTINUE"
176 PAUSE 4E4: CLS
180 LET lt=16*l-4
190 LPRINT b$: LPRINT b$
200 FOR n=1 TO lt
205 LPRINT
210 IF n=lt*8-2 THEN LPRINT e$
220 NEXT n
230 LPRINT t$: LPRINT t$
240 STOP
300 LPRINT e$: GO TO 220

```

[illegible]

[illegible]

TS1000 REVIEW: Stock Plot

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Hauppauge, New York 11788

If the terms "Dow Jones Industrial Average", "Price Earnings Ratio", "shares", "Current Dollar Profit", and "Portfolio" mean anything special to you, buying this program might just be the kind of "investment" you'd like to look into.

STOCK PLOT is a program, written in BASIC, that plots the prices and volumes for the last 26 weeks on 19 user-selected stocks, and tabulates other useful information. The compiled data are presented to the user in the form of a graph, plotting the dollar price and volume of an individual stock. Also available are two tables, the first of which lists the stock symbol, year's Hi/Lo, P/E Ratio, purchase price, current price, percent profit, the averages of the purchase price and current price of the portfolio. The second table shows the number of shares of each stock, the dollar cost, current dollar value, current dollar profit (loss), the totals of the previous four items, and the percent profit (loss) for the portfolio of all 19 stocks.

For substantially less than the cost of a single share of IBM, you will receive a neatly packaged cassette tape containing two copies of STOCK PLOT. Side one contains a cleared, ready to use version of

the program. Side two contains the same program but loaded with examples that will help familiarize you with the program's options. Also included is a 13 page 8-1/2" X 11" format pamphlet, written by the author, that not only explains how to load and use the program, but also contains a full program listing, an explanation of how each routine works, and suggestions, tips, and hints for modifying STOCK PLOT to suit your own individual needs.

The Program is easy to use, with sufficient screen prompts to make learning and using STOCK PLOT a relatively simple task. For those of you who own disc drives, the program is easily modified and transferred to disc. While originally intended for use with a 2040 printer, STOCK PLOT will work with both Memotech and Aerco I/F's, to print out most of the data. The only problem occurs when printing a stock price/volume graph. The weekly stock price is represented by a graphic inverse space. The above-mentioned printer I/Fs won't print that particular symbol, so some program modification will be needed if you wish to use the graph print function.[See SWN Vol. 1 LPRINT Hints if your printer allows block graphics. -fn]

Reviewed by: Jeffrey Moore

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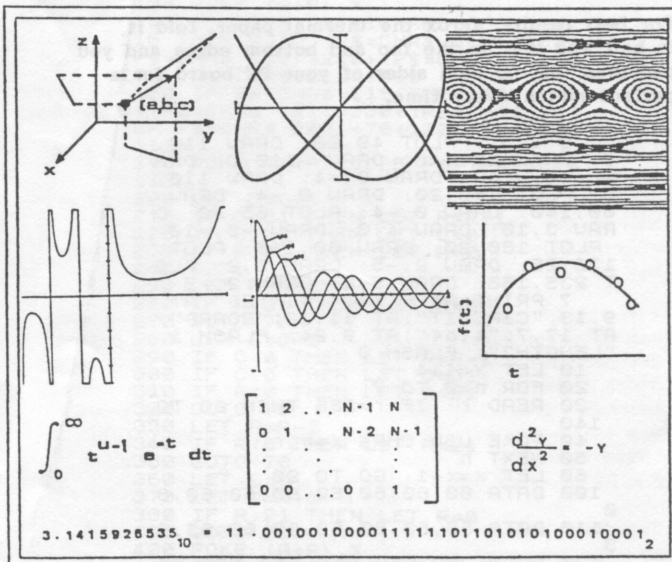
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